

**TESTIMONY OF DR. GABRIELA CHAVARRIA, SCIENCE ADVISOR TO THE DIRECTOR
OF THE U.S. FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR
BEFORE THE HOUSE NATURAL RESOURCES
SUBCOMMITTEE ON FISHERIES, WILDLIFE, OCEANS AND INSULAR AFFAIRS**

JUNE 24, 2011

Chairman Fleming, Ranking Member Sablan, and Members of the Subcommittee, I am Dr. Gabriela Chavarria, Science Advisor to the Director of the U.S. Fish and Wildlife Service (FWS). I am accompanied by Dr. David Blehert with the U.S. Geological Survey (USGS) National Wildlife Health Center. Thank you for the opportunity to update the Subcommittee on white-nose syndrome in bats, the National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome (WNS) in Bats, which was released in May of 2011 and the Department of the Interior's (Department) role in addressing this problem.

The sudden and widespread mortality associated with this disease has never before been observed in any of the more than 1,100 species of bats known to science. Since the Department first testified before the Subcommittee on this topic in 2009, significant progress has been made toward identifying and understanding the cause and ecology of white-nose syndrome.

Background

White-nose syndrome was first recorded in March of 2007 near Albany, New York. WNS is associated with greater than 90 percent mortality of hibernating bats in affected caves from the Northeast to the South and into the Midwest of the United States. It has also been confirmed in Canada. In some caves within its current range, close to 100% of hibernating bat populations have died. Thus far, six bat species have been confirmed with the disease, including the federally endangered Indiana bat. The fungus associated with WNS has been detected on an additional three bat species, including the federally endangered gray bat.

Affected bats may display a white powdery growth on their faces and many show tissue damage and scarring in their wings. The powdery growth and tissue damage is caused by a fungus from a group of fungi that is common in the soil environment. However, this particular species of fungus, *Geomyces destructans*, was not known to science until it was documented in association with WNS in 2008. It grows only in cold temperatures, and unlike other fungi found in bat hibernation sites, it invades living tissues of hibernating bats. When hibernating, bats lower their body temperature significantly, and may pack tightly together – two factors which seem to promote the spread of the fungus from bat to bat. Although the primary route of transmission is believed to be from bat to bat, WNS may be inadvertently spread from cave to cave by human activity in caves. Although the exact cause of mortality of affected bats is not yet fully understood, evidence to date suggests *G. destructans* is the likely cause. Dead bats are often found to be emaciated, and bats in affected caves have been observed exhibiting more activity than is normal during hibernation, including leaving caves

on cold winter days. Since 2007, WNS has been confirmed in over 190 sites in 16 states¹ and 4 Canadian provinces.

The species of bats thus far affected by WNS are insectivorous, and they all rely on hibernation as a strategy for surviving harsh winter conditions when their insect food is not available. Prior to hibernation, these bats build up fat reserves to sustain them through the winter. Maintaining a low body temperature during hibernation, just a few degrees above the temperature of their cave, allows them to survive the winter on their stored fat, which can be quickly depleted in only a few hours of non-hibernation activity.

G. destructans has been observed to invade the skin and underlying tissue, particularly of the wings of affected bats, where it causes significant damage. Wing membranes represent about 85 percent of a bat's total surface area and play a critical role in balancing complex physiological processes, such as body temperature regulation, blood pressure, water balance, and gas exchange, as well as allowing bats to fly and to capture insect prey. Scientists are investigating how WNS interferes with these critical functions and how it contributes to the loss of body fat reserves in affected bats.

For some small mammal species, a mass mortality event like that caused by WNS would not significantly affect the long-term sustainability of their populations. However, bats differ from most other small mammals in that they have long lives and reproduce slowly -- a combination that precludes rapid population growth and recovery. Most of the bat species currently affected by WNS live about 5-15 years and have only one offspring per year. Biologists are concerned that, even if WNS and its spread could be abated, it will take many decades for populations of WNS affected bat species to recover.

The Department is concerned about the potential impact of WNS on bat populations, especially those species currently listed as federally endangered, due to the high mortality of WNS and its rapid spread. There are 25 bat species in North America that hibernate during the winter, and all are at risk for WNS. Of these, there are four species and subspecies of federally listed, hibernating bats, all of which hibernate in either caves or mines.

Most recently, WNS was confirmed in Maine, Indiana, Kentucky, Ohio, Tennessee, and North Carolina, demonstrating its continued spread from Northeastern and Mid-Atlantic states to Southeastern and Midwestern states. These regions support much larger caves and populations of hibernating bats, including millions of individuals of several species. These populations include the majority of the remaining populations of the federally endangered gray bat and remaining populations of the federally endangered Virginia big-eared bat, of which there are only about 20,000 individuals remaining. It is possible that other federally listed bat species, such as the Ozark big-eared bat, may be impacted if the disease continues to spread. Also, significant mortality of more common species may threaten the stability and health of these populations. The FWS is currently reviewing the status of two bat

¹ New Hampshire, New York, Vermont, Connecticut, Pennsylvania, Virginia, West Virginia, New Jersey, Massachusetts, Maryland, North Carolina, Ohio, Tennessee, Kentucky, Maine, Indiana.

species -- the Eastern small-footed bat and the Northern long-eared bat -- in response to petitions to list them under the Endangered Species Act.

The role of bats in larger ecosystems is not well understood, but bat species comprise about one-fifth of all mammal species in the world, making their loss potentially significant to the sustainability of other animals and the plants that share their landscapes. One million bats can consume up to 8,000 lbs of flying insects in one night, including pests like mosquitoes and moths. As predators of these insects, bats play an important role in protecting agriculture crops and forests and in reducing risk of human disease transmitted by flying insects.

In addition to impacts on biological resources, WNS will have impacts on some local economies through reduced opportunities for tourists. Caves with bats are the primary attractions at many national park units, including Mammoth Cave National Park (Kentucky), Carlsbad Caverns National Park (New Mexico), and Timpanogos Cave National Monument (Utah), Lava Beds National Monument (California) and Ozark National Scenic Riverways (Missouri). *G. destructans* has been detected in four national park units: Delaware Water Gap National Recreation Area (Pennsylvania and New Jersey), Great Smoky Mountains National Park (Tennessee and North Carolina), New River Gorge National River (West Virginia), and Ozark National Scenic Riverways (Missouri).

Cave closures and drastically reduced bat populations could impact the enjoyment of visitors who come to see them on national park units and other lands. The closure of caves could also reduce opportunities for recreational caving and could impact many caving organizations, clubs, and local grottos that rely on access to these resources. As caves and bat populations on federal lands are affected by WNS, gateway communities, outdoor recreation guides, and outfitters may experience loss of visitors and income.

U.S. Department of the Interior Response to WNS

The Department is leading a cooperative and coordinated response among its bureaus, including the FWS, the National Park Service (NPS), the Bureau of Land Management (BLM), and the USGS, as well as the U.S. Department of Agriculture, the U.S. Department of Defense, and other affected Federal agencies; all states; provincial and federal Canadian agencies; the academic community; private nonprofit organizations; and other stakeholders. Through the FWS, the Department has assembled a team of experts from these agencies and stakeholders to address this disease. Today, more than 100 partners are working together to identify the impact of WNS on bat populations and the ecosystem as a whole, the mechanisms by which the disease is transmitted and the mechanism through which it contributes to mortality in affected bats. The team is also cooperating to monitor the spread of WNS and to develop management and containment options for federal and state wildlife managers.

One of the team's priorities is to provide resource managers with management recommendations, based on the best available science, to control the spread and minimize the effects of WNS. To this end, the Department and its partners, including the U.S. Department of Agriculture, the U.S. Department of Defense, the Association of Fish and

Wildlife Agencies, tribal agencies, and others have developed a National Plan to guide the collective response to the research and management of WNS.

The National Plan focuses on seven elements through working groups, including:

- Communications
- Data and Technical Information Management
- Diagnostics
- Disease Management
- Epidemiological and Ecological Research
- Disease Surveillance
- Conservation and Recovery

The National Plan also formally establishes two oversight committees with representation from Federal, State, and tribal resource management agencies. The National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats is based on similar disease response plans that have effectively been implemented in the past (e.g. Chronic Wasting Disease), and builds upon the coordinated efforts to address WNS, initiated in 2008.

U.S. Fish and Wildlife Service

The FWS is coordinating the Department's response to WNS, and continues to collect and distribute critical information to other Federal agencies, States, partners, and the public; to administer several of the working groups and/or sub-groups established through the National Plan; and to work with stakeholders to identify and carry out collaborative investigations, monitoring, and management actions. The FWS serves as the primary resource for up-to-date information and recommendations for all partners, such as important decontamination protocols for cave researchers and visitors and a cave access advisory that requests a voluntary moratorium on activities in caves in affected states to minimize the potential spread of WNS.

The FWS has dedicated funding toward WNS in fiscal years 2007 through 2011 for coordination, research, and state assistance. In addition to developing science-based protocols and guidance for land management agencies and other partners to minimize the spread of WNS, the FWS has funded numerous research projects to support and assess management recommendations and improve our basic understanding of the dynamics of the disease. These have included investigations into the transmission and etiology of the disease, the factors that influence the apparent differences in vulnerability of different bats to WNS, the genetic differences between samples of *G. destructans* from around North America and Europe, and the potential for species or individuals to develop resistance to the effects of the fungal infection. With funds provided by the FWS, for example, the U.S. Forest Service is developing DNA-based detection techniques to distinguish the pathogenic fungus from many closely related non-pathogenic *Geomyces* species in North American caves. As new data are collected and analyzed, the FWS has coordinated with partners to develop science-based approaches to addressing this disease within the framework of the National Plan.

Information on WNS-related research projects is available at:
<http://www.fws.gov/whitenosesyndrome/research.html>.

The FWS continues to work with and support states in identifying and monitoring bat hibernacula, surveying for WNS, and preparing response plans. This role is becoming increasingly complex as WNS continues to spread to new states and regions of the nation. The FWS will continue to monitor federally listed species impacted by WNS and to support states in monitoring and management of WNS in species under state jurisdiction through State Wildlife Grants and other programs.

U.S. Geological Survey

The USGS, DOI's science bureau, has unique capabilities to address emerging wildlife diseases, including specialized facilities for diagnosing and researching wildlife diseases, as well as expertise in field studies of bats. Since 2008, researchers with the USGS National Wildlife Health Center and the Fort Collins Science Center, in collaboration with partners, established criteria for diagnosing WNS; identified and first documented the fungus, *G. destructans*; linked this newly identified fungus to the cause of the skin infection that is the hallmark of WNS; and developed rapid diagnostic tests for *G. destructans*. Additional work by USGS and research partners identified probable modes of disease transmission, proposed mechanisms by which WNS causes bats to die, confirmed the presence of viable fungus (*G. destructans*) in cave environments, and documented recovery of bats naturally infected with WNS. The USGS National Wildlife Health Center, along with many partners, continues to play a primary role in WNS research. Projects underway include studies to understand WNS transmission/ pathogenesis/recovery, comparative genomic analyses to determine the origin of *G. destructans*, development of improved tools for molecular detection of *G. destructans*, and investigation into the microbial ecology of *G. destructans* in bat hibernacula.

In order to fully implement the National Plan, USGS is assessing its capacities to most effectively manage WNS, including better methods of detecting the disease early, training personnel to conduct active field surveillance and sample collection, increasing diagnostic testing of field samples, and additional ecological field research aimed at providing the science-based guidance needed by state and federal agencies managing this devastating disease. Improved diagnostics, surveillance, and research will contribute to a better understanding of how WNS spreads and will help to identify weak links in the disease cycle that can be exploited to manage and control WNS.

National Park Service

The National Park System contains 394 national park units comprising approximately 84 million acres. Nearly one in four national park units have caves, and one in three units contain mines that can provide habitat for bats. System-wide, all 45 species of bats in North America occur in national park units, including seven species that are federally listed as threatened or endangered, and numerous others that are listed through state laws as threatened or endangered.

The NPS comprises one of the largest systems for informal learning in the world, and it educates millions of visitors about cave ecosystems, bats, and the potentially devastating impacts of WNS. Commercial cave operations in parks, such as Mammoth Cave and Carlsbad National Parks, remain open. NPS guidance recommends that access to caves requires a permit or tour ticket, which has enabled NPS to be proactive in minimizing the risk of visitors in spreading WNS. Visitors are screened prior to cave entry and gear is disinfected when necessary. The NPS develops guidance for parks through a working group comprised of veterinarians, managers, and ecologists from across the national park system. In addition, NPS continues to work with multiple partners to investigate WNS and its impacts on bat populations by providing access to sites, samples for analyses, and assisting planning for coordinated response.

Bureau of Land Management

The BLM, responsible for managing more than 245 million acres of public lands, is working to better understand and prevent the spread of WNS. The BLM was an active participant in the recently released national plan and is now focused on plan implementation. BLM Field Offices have been instructed to consider restricting access to caves and abandoned mines on BLM-administered lands and to use a targeted approach to closure that prioritizes sites with important bat resources. Prior to the completion of the 2011 national plan, the BLM in New Mexico closed 28 caves to public visitation in an effort to reduce the threat of WNS to bats. The BLM issued policy to encourage the continued engagement of external stakeholders to prevent or contain the spread of WNS including additional cave and abandoned mine closures in areas with important bat resources.

Limiting Potential for Human Transmission

The Department is working closely with the recreational caving and cave research communities to develop and improve decontamination protocols and cave access recommendations to prevent potential spread of the fungus through human activities. A decontamination protocol team has been formed, consisting of participants from across state and federal agencies, and the cave and karst research community, and the team is working to maintain consistency in methodology while incorporating the latest procedures. In March 2009, the FWS issued an advisory recommending voluntary suspension of caving activities in the states with affected bats, as well as in the adjoining states. In addition, the FWS has developed guidelines for scientists working in hibernacula to take precautions to avoid spreading the disease. The NPS has closed "wild" caves and mines in several units of the National Park System, although large, commercial caves in national park units remain open at this time. More closures may occur in response to the further spread of WNS. Several states have closed caves on lands under their management, including Indiana, Kentucky, and Wisconsin. Wisconsin has also designated *G. destructans* as an invasive species, making its transport an act which can be prosecuted under state law. The National Wildlife Refuge System (Refuge System) under FWS management includes lands with significant bat hibernacula, including those of the federally listed gray bat. All caves and abandoned mines on Refuge System lands have been closed to public entry to protect wildlife, including bats, from human disturbance.

Conclusion

White-nose syndrome remains the greatest challenge to bat conservation we have ever faced. The Department is dedicated to continuing its coordination of research and response to WNS and its impact on bat populations. Through ongoing efforts to improve diagnostic techniques, to expand disease surveillance, and to enhance research efforts, we hope to continue to further our understanding of WNS to identify weak links in the disease cycle that can be exploited to manage and control this devastating wildlife disease. We also hope to refine and improve the processes and framework through which we address and manage similar wildlife health crises. The Department appreciates your interest in WNS and our collective efforts to address it. We look forward to working with you to slow the spread of this disease and to mitigate its impacts on bat populations.

Thank you for the opportunity to testify before you today. I would be happy to answer any questions that you or the committee members might have.